

ECONOMIC CONTRIBUTIONS OF MISSOURI AGRICULTURE AND FORESTRY

Prepared
for:



Prepared
by:



December 2016

Contents

List of Figures	3
List of Tables	3
Executive Summary	5
Key Findings.....	5
Background	6
Missouri Agriculture	6
Missouri Farm Demographics	7
Forestry	9
Methodology	10
Complementary Analysis	10
Defining Agriculture and Forestry	10
State Level Results	13
State Sales	13
State Jobs	15
State Value-Added.....	17
State Labor Income	19
Tax Summary	21
Results by Industry	22
Crops, Livestock, Forestry and Fishery Production	22
Agriculture Inputs and Services	23
Food and Related Products Manufacturing	24
Forestry Products Manufacturing	25
Looking Ahead	26
U.S. and Missouri Farm Income	26
Aging Farmer Demographics	27
Fruit and Vegetable Production Opportunities	27
Appendix A, Detailed Results	28

List of Figures

Figure 1, Missouri Principal Farm Operators by Age Group	7
Figure 2, Number of Missouri Farms by Size	8
Figure 3, Number of Missouri Farms by Ownership Type	8
Figure 4, Agriculture and Forestry Industries Present by County	12
Figure 5, State of Missouri Value-Added Summary (\$B)	13
Figure 6, Agriculture, Forestry and Related Industries: Total Sales by County (\$M)	14
Figure 7, State of Missouri Employment Summary	15
Figure 8, Agriculture, Forestry and Related Industries: Total Jobs by County	16
Figure 9, State of Missouri Value-Added Summary (\$B)	17
Figure 10, Agriculture, Forestry and Related Industries: Total Value-Added by County (\$M)	18
Figure 11, State of Missouri Labor Income Summary (\$B)	19
Figure 12, Agriculture, Forestry and Related Industries: Total Labor Income by County (\$M)	20
Figure 13, State of Missouri Tax Summary (\$B)	21
Figure 14, Missouri Crops, Livestock, Forestry & Fisheries Prod: Total Value-Added (\$M)	22
Figure 15, Missouri Agriculture Inputs and Services: Total Value-Added (\$M)	23
Figure 16, Missouri Food and Related Products Manufacturing: Total Value-Added (\$M)	24
Figure 17, Missouri Forestry Products Manufacturing: Total Value-Added (\$M)	25
Figure 18, Missouri Cash Receipts: Selected Commodities	26

List of Tables

Table 1, Acronyms	4
Table 2, Missouri Farm Demographics	7
Table 3, Missouri Farm Sales by Source	9
Table 4, Missouri Forestry Acres	9
Table 5, Missouri Crops, Livestock, Forestry and Fishery Production - Detailed Results	28
Table 6, Missouri Agriculture Inputs & Services - Detailed Results	29
Table 7, Missouri Forestry Products Manufacturing - Detailed Results	29
Table 8, Missouri Food and Related Products Manufacturing - Detailed Results	30

Table 1, Acronyms

<u>Acronym</u>	<u>Description</u>
USDA	United States Department of Agriculture
USDA/NASS	United States Department of Agriculture, National Agricultural Statistics Service
USDA/ERS	United States Department of Agriculture, Economic Research Service
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
GDP	Gross Domestic Product

Executive Summary

The State of Missouri has a diverse agriculture industry that is especially strong in growing grains and oilseeds (soybeans), cattle and hog farming and many further processing for food and forestry industries. This study of the Economic Contributions of Missouri Agriculture and Forestry quantifies the importance of these industries to the state.

This study was produced using a combination of datasets including the IMPLAN modeling system, the 2012 USDA Census of Agriculture, as well as other USDA/NASS datasets. This report looks at the economic activity tied to production agriculture, forestry, processing, and various support activities. All ninety-nine industries identified and analyzed in this study can be found in Appendix A.

The results of this study show the diminishment of these industries would have negative impacts across the State of Missouri. Due to the importance of agriculture and forestry to the economic well-being of Missouri, one can expect that these industries will remain key players in the state.

Key Findings

In 2016, agriculture, forestry and related industries in Missouri contributed:

- **\$33.0 billion** (9.3% of Missouri total) in value-added
 - \$88.4 (14.8% of Missouri total) billion in sales minus \$55.4 billion in inputs
- **378,232** (10.5% of Missouri total) jobs
- **\$17.5 billion** (9.3% of Missouri total) in labor income
- **\$2.2 billion** in state/local taxes
- **\$4.0 billion** in federal taxes

Of the **\$33.0 billion** in added value from the agriculture, forestry, and related economic activity:

- Crops, Livestock, Forestry, and Fisheries Production contributed: **\$9.4 billion**
- Agriculture Inputs and Services contributed: **\$5.0 billion**
- Food and Related Products Manufacturing contributed: **\$15.5 billion**
- Forestry Products Manufacturing contributed: **\$3.2 billion**

Of the industries studied, the following are the top three contributors of value-added to the State of Missouri:

- Breweries: **\$2.9 billion**
- Oilseed Farming: **\$2.3 billion**
- Dog and Cat Food Manufacturing: **\$2.3 billion**

In addition to analyzing agriculture, forestry, and related economic activity at the state level, county level and congressional district results are available in separate reports. These can be found at: <http://agriculture.mo.gov/economicimpact/>.

Background

This study on the Economic Contributions of Missouri Agriculture and Forestry quantifies agriculture, forestry and related industries and their importance to the State of Missouri and each of the 114 counties and eight congressional districts in the state. This study relies heavily on data from the IMPLAN modeling system, the United States Department of Agriculture (USDA) 2012 Census of Agriculture, and other USDA/National Agricultural Statistics Service datasets. This 2016 Economic Contributions of Missouri Agriculture and Forestry is patterned in principle after similar [Decision Innovation Solutions \(DIS\) studies](#) for Iowa in 2009 and 2014, South Dakota in 2014, Illinois in 2015, and Alabama in 2016. The following provides important context for agriculture and forestry in the State of Missouri.

Missouri Agriculture

According to the National Agricultural Statistics Service (2016 Quick Stats) and the Missouri Department of Agriculture, Missouri is ranked in the top ten states for:

- Number of farm operations (#2)
- Biodiesel production (#2)
- Forage land used for all hay, haylage, grass silage, and greenchop acres (#2)
- Beef cows (#3)
- Turkeys inventory (#4)
- Soybean acres (#4)
- Rice acres harvested (#4)
- Hogs and pigs sales (#7)
- Broilers and other meat-type chickens inventory (#9)
- Corn acres planted (#9)
- Cotton and cotton seed sales (#9)
- Ice cream production (#9)

Additionally, other important agricultural production in Missouri includes:

- Ethanol production¹ (#12)
- Pullets inventory (#13)
- All wheat for grain acres (#13)
- Tobacco sales (#15)
- Sheep, goats and their products (#15))

¹ Missouri Department of Energy March 17, 2016 “*State Profile and Energy Estimates*”

Missouri Farm Demographics

According to the USDA Census of Agriculture (conducted every 5 years), there were 99,171 farms² in Missouri in 2012. The average farm size in Missouri increased slightly from 269 acres in 2007 to 285 acres in 2012, but is still below the U.S. average size of 434 acres. The 2012 average market value of land and buildings per farm has increased 170% since 1997 to \$795,444. The average value of machinery and equipment per farm has also continued to rise over time, rising from \$39,084 in 1997 to \$88,960 in 2012.

Table 2, Missouri Farm Demographics

	<u>1997</u>	<u>2002</u>	<u>2007</u>	<u>2012</u>
Number of Farms	110,986	106,797	107,825	99,171
Average Size of Farms (acres)	272	280	269	285
Average age of principal operator	54	56	57	58
Average market value per farm				
Land and Buildings	\$294,636	\$424,327	\$586,478	\$795,444
Machinery and Equipment	\$39,084	\$49,940	\$68,171	\$88,960
Farm Products Sold	\$49,250	\$46,661	\$69,677	\$92,415

The average age of Missouri farmers has increased from 54 in 1997 to 58 in 2012. Figure 1 shows that there is a fairly smaller number of young farmers and that the majority fall into the 45-54 and 70+ age groups. Moving forward, there is a strong group of experienced farmers in the 45-54 age group prepared to help relieve the farmers 70 years and older, but development of a younger generation of farmers is also critical for the future success of Missouri farms.

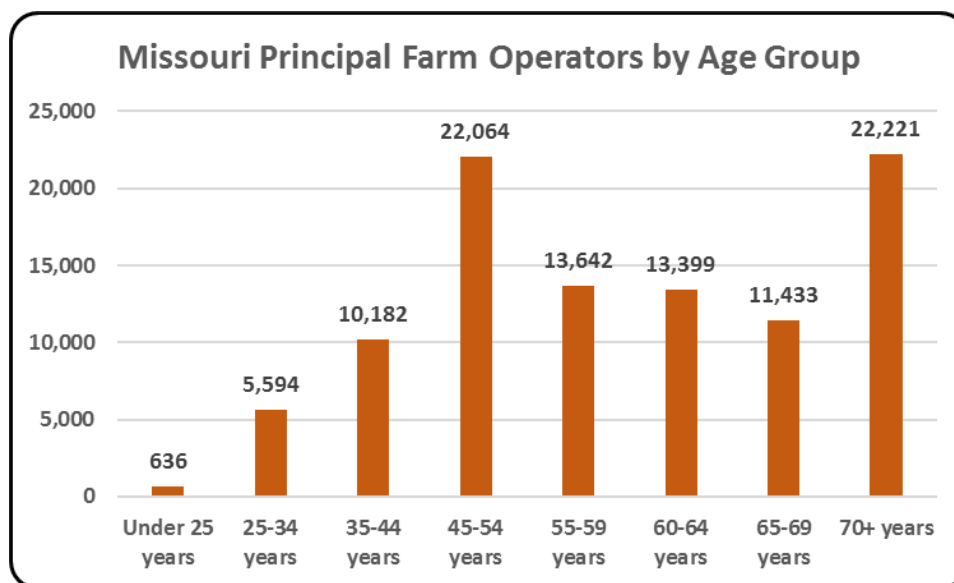


Figure 1, Missouri Principal Farm Operators by Age Group

² The U.S. Agriculture Department (USDA) defines a “farm” as any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the year.

Figure 2 displays the breakdown of Missouri farms by size. As shown, the most common size for a Missouri farm is 50 to 179 acres. While the number of farms in the largest size category is fewer, these higher acreage farms typically make up the majority of farm sales. Smaller farms are generally hobby or specialty farms.

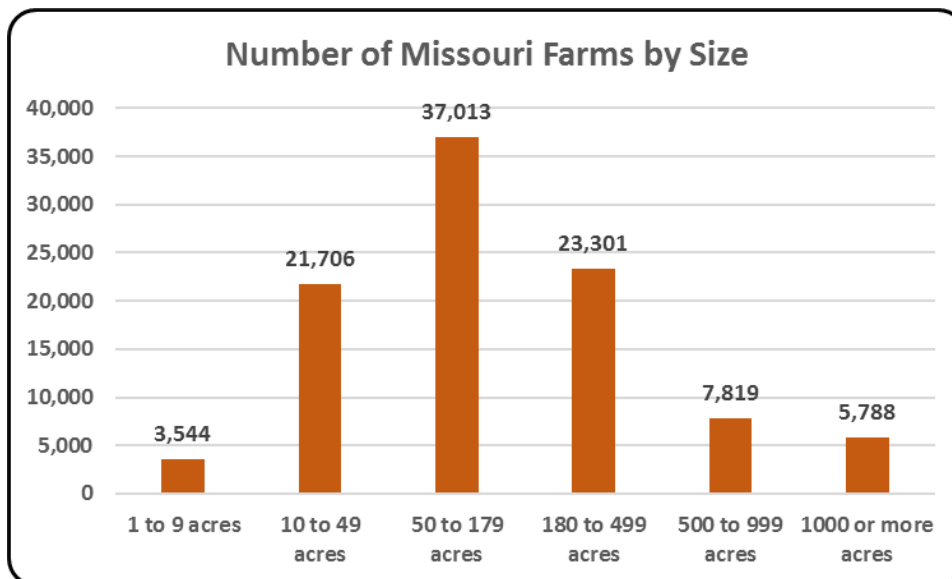


Figure 2, Number of Missouri Farms by Size

Out of the 99,171 farms in Missouri, the majority are owned by families or individuals (88,713), while only 289 are held by non-family corporations.

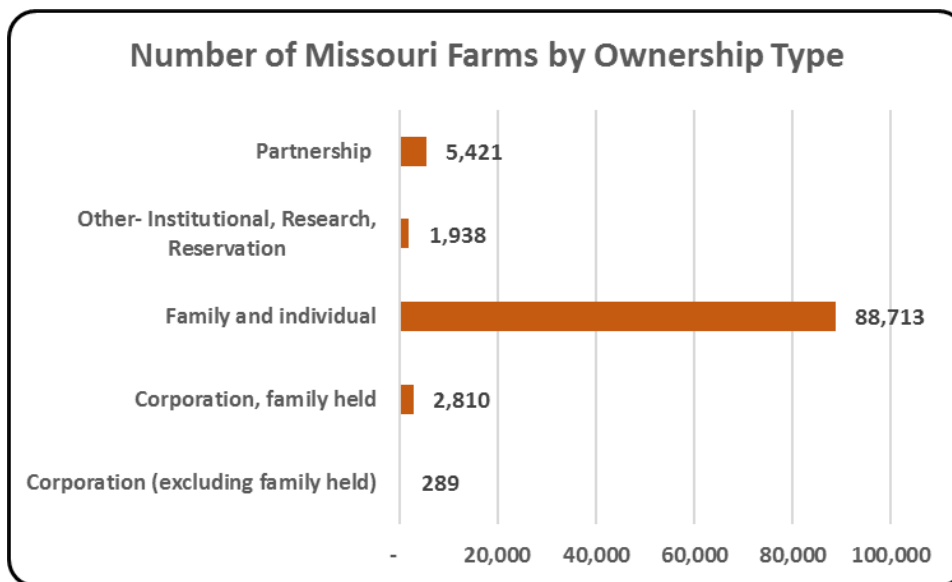


Figure 3, Number of Missouri Farms by Ownership Type

Total farm sales by source are shown below in Table 3. Farm sales in Missouri are generated from a wide variety of crops and livestock with some of the top areas including grains and oilseeds, cattle and calves, and poultry and eggs. In addition to these, many other types of crops and livestock thrive in Missouri, which helps demonstrate the strength and flexibility of agriculture and related industries.

Table 3, Missouri Farm Sales by Source

	1997	2002	2007	2012
Total Sales (\$1,000)	\$5,466,009	\$4,983,255	\$7,512,926	\$9,164,886
Crops, including nursery and greenhouse (\$1,000)	\$2,389,939	\$1,992,446	\$3,494,938	\$4,566,953
Cotton and cottonseed	\$177,167	\$137,378	\$164,714	\$248,631
Cut Christmas trees and short-rotation woody crops		\$1,843	\$1,078	\$1,146
Fruits, tree nuts, and berries	\$13,486	\$22,823	\$4,315	\$25,749
Grains, oilseeds, dry beans, and dry peas		\$1,546,535	\$2,963,208	\$3,922,873
Nursery, greenhouse, floriculture, and sod		\$101,316	\$121,280	\$88,135
Other crops and hay		\$139,973	\$173,618	\$215,921
Tobacco	\$10,570	\$5,854	\$5,022	\$1,375
Vegetables, melons, potatoes, and sweet potatoes		\$36,723	\$61,705	\$63,122
Livestock, Poultry and their products (\$1,000)	\$3,076,070	\$2,990,809	\$4,017,988	\$4,597,933
Aquaculture		\$11,107	\$9,506	\$10,256
Cattle and Calves	\$1,143,320	\$1,285,288	\$1,676,632	\$1,968,617
Hogs and Pigs	\$841,644	\$570,551	\$725,738	\$882,526
Horses, ponies, mules, burros, and donkeys		\$27,111	\$21,369	\$22,635
Milk and other dairy products from cows	\$293,411	\$300,460	\$302,684	\$246,358
Other animals and their products		\$5,796	\$7,313	\$8,612
Poultry and Eggs	\$755,708	\$784,986	\$1,265,166	\$1,441,676
Sheep, goats, and their products		\$5,508	\$9,580	\$17,254

Forestry

According to the 2012 USDA Forest Resources of the United States report³, forest land in Missouri makes up about 35 percent of total land area in the state (nearly 15.5 million acres). About eighty-two percent of the total forest land in Missouri is privately held, while the other eighteen percent is publicly held. Forest land in Missouri has seen a slight increase (2.6%), going from 15.1 million acres in 2007 to nearly 15.5 million acres in 2012.

Table 4, Missouri Forestry Acres

	Land area (thousand acres)
Total Land Area	43,995
Total Forest Land	15,472
Total Timberland	15,085
Timberland – Planted	142
Timberland – Natural origin	14,943
Forest Land – Reserved	185
Forest Land – Other	202
Other Land	28,523

³ http://www.srs.fs.usda.gov/pubs/gtr/gtr_wo091.pdf

Methodology

The 2016 Missouri Agriculture and Forestry Economic Contribution Study was completed with a combination of the 2014 Missouri IMPLAN dataset, data from the USDA 2012 Census of Agriculture, and other USDA/NASS sources. The IMPLAN modeling system and Microsoft Excel were used for calculating and tabulating the results of this analysis. While the 2014 IMPLAN dataset was used to calculate the economic contribution results, they have been adjusted forward to 2016 dollars using inflation factors within the IMPLAN modeling system. Results shown throughout this report are presented using these common economic modeling terms:

- **Sales (Output)**
 - The broadest measure of economic activity – sometimes referred to as “output”
- **Employment (Jobs)**
 - A measure of job positions without regard to whether they are full-time equivalents
- **Value-Added**
 - Sales (output) minus the cost of inputs
- **Labor Income**
 - The sum of Employee Compensation (work for hire) and Proprietor Income (self-employed) and is a sub-component of value-added.

Complementary Analysis

As can be the case, multiple reports studying the same subject (all or in part) may be available. Such is the case with a [recent analysis](#) conducted by the University of Missouri Extension (Ryan Milhollin, Joe Horner and Brett Lenz) on behalf of the Missouri Soybean Merchandising Council (MSMC) in May 2016. The University of Missouri analysis dealt with the animal agriculture component of Missouri agriculture. As shown in their report, the industries studied included all livestock and poultry sectors plus the processing of the products that come from those industries (i.e., milk processing, etc.). As discussed later in this section, all industries part of the University of Missouri report are included in this analysis.

There can be wide variability in methodology among authors of studies such as these. This can yield large differences in results that may be difficult to explain. However, both the authors of this study and the University of Missouri study adopted the same methodology (that recommended by the IMPLAN group). In our post analysis assessment, ninety-three percent of the results in both studies of animal agriculture were within five percent of each other. Readers of this report can therefore assume that the studies are directly comparable to one another.

Defining Agriculture and Forestry

When completing an economic contribution study, there are generally questions as to what economic activity up and down the value chain should be included for a particular industry. Outlined below is the process used in this study for defining agriculture; the same guidelines have been applied to the forestry industry.

There is usually considerable discussion regarding the blurred lines between production agriculture, processing and retail, and how agriculture should be defined. Agriculture can be defined as: 1) including only farm-level production, 2) including farm-level production, input manufacturing, and food processing, or 3) from the “farm to fork” perspective, which would also include distribution and retail.

While there is room for discussion as to what rightly should and should not be included as part of the agriculture sector, there are few arguments that its inclusion should be limited to strictly the production of crops and livestock. This is because in its most basic form, the crop and livestock processing, slaughtering, meat, and rendering industries depend nearly completely upon economic activities that produce primary agricultural commodities (crops, livestock, etc.), which takes place at the farm level.

To move beyond the production and processing of agricultural products (i.e., to include grocery stores) opens an analysis up to criticism related to whether the inclusion of additional layers of the value chain inflate the numbers associated with the agriculture industry. For example, if one were to include grocery stores as a component of agriculture, what would be the appropriate method to separate agricultural products from other products within a typical grocery store? The fact that grocery stores also sell household goods, often house banks, and offer personal services add to the precarious nature of including them as part of agriculture.

To strike middle (and defensible) ground between including more than just farm level production and seeking to attribute excess economic activity to the animal agriculture industry, this analysis includes production agriculture plus the first round of value added to the process. For example, in addition to the production of livestock and poultry, we have also included the industries that process them (i.e., production, processing, slaughtering, and rendering). As mentioned above, we have followed this same pattern of analyzing other agricultural industries (e.g., crops), forestry production and further processing (sawmills, etc.).

Using the above rationale as a guide, the IMPLAN models were created and analyzed using the recommended methodology for a Multi-Industry Contribution Analysis⁴. The IMPLAN modeling system uses more than 20,000 industries and classifies them according to the North American Industry Classification System (NAICS) and groups them into 536 industries. The 99 IMPLAN sectors identified for this analysis to represent agriculture, forestry, and related economic activities are shown in Appendix A. In addition to these state level results, the overall study produced results for 123 study areas: 114 counties, 8 congressional districts, and the State of Missouri.

Out of the ninety-nine IMPLAN industries identified, only some of those industries exist in each of the counties. Figure 4 summarizes how many of the ninety-nine industries are present in each county⁵. Eighty-eight of the ninety-nine are present in the State of Missouri.

⁴ http://support.implan.com/index.php?option=com_content&view=article&layout=edit&id=366

⁵ The IMPLAN data used in this study separates the City of St. Louis from the rest of St. Louis County. We opted to combine these two study areas into one for purposes of comparing counties to one another.

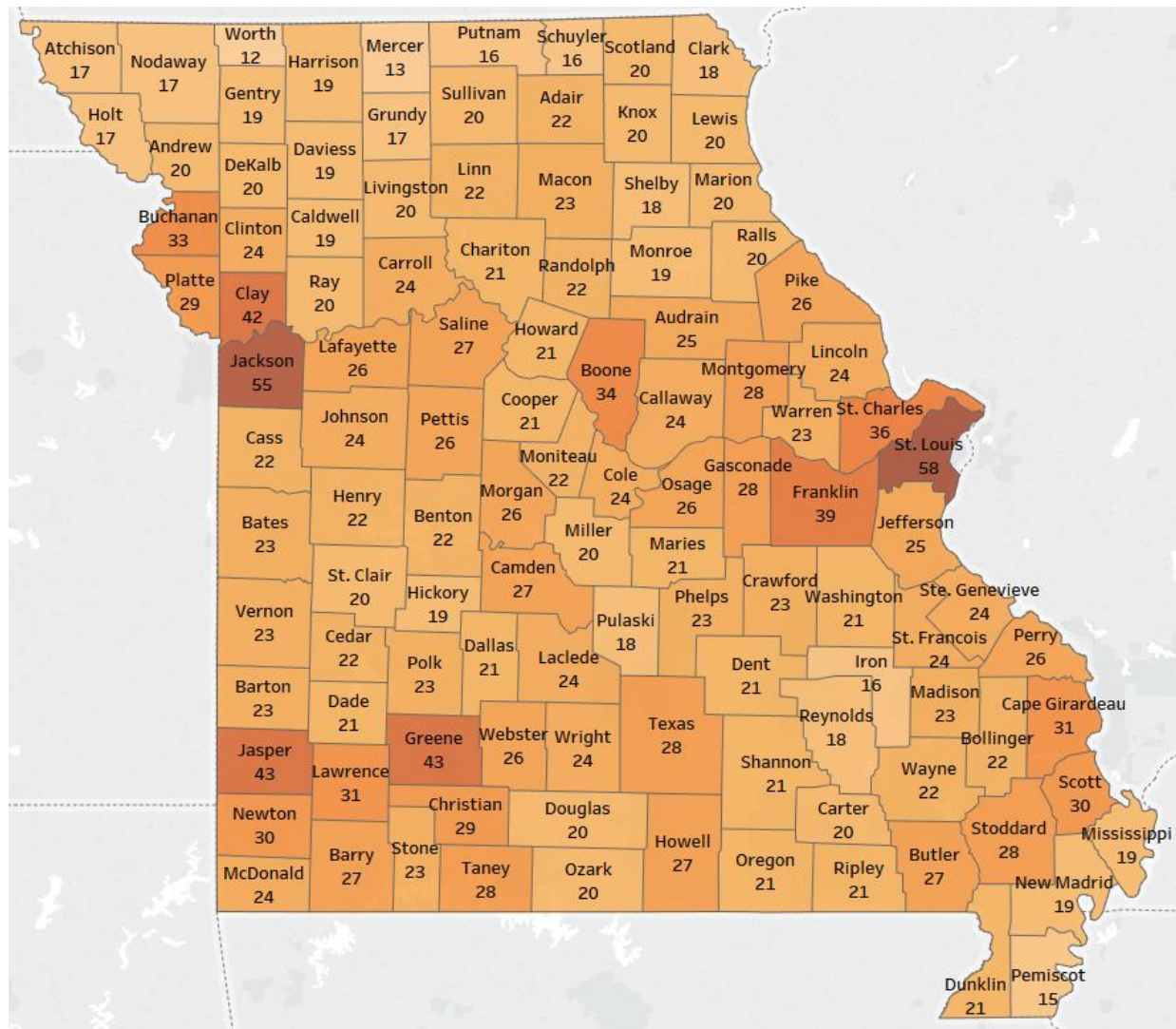


Figure 4, Agriculture and Forestry Industries Present by County

State Level Results

The ninety-nine IMPLAN sectors identified in this study were aggregated into four main categories to provide an overview of the economic contribution of these industries. These aggregated industries are:

- Crops, Livestock, Forestry, and Fishery Production
- Agriculture Inputs and Services (used to support production)
- Food and Related Products Manufacturing
- Forestry Products Manufacturing

The state level results for these four aggregated categories are presented below. County and congressional level results are available in separate reports and can be found at:

<http://agriculture.mo.gov/economicimpact/>.

State Sales

“Total sales” refers to the total value of all of the sales (also known as production or output) of identified industries within a study area. This is a total number that does not make deductions for the cost or origination of inputs that were used in the production process, which means that there is some double-counting that occurs with the measure of economic activity. Figure 5 illustrates the contribution of agriculture, forestry and related industries to Missouri’s total agriculture, forestry and related industries. As shown, Missouri’s agriculture, forestry and related economic activities contribute significantly to the state economy at about \$88.4 billion in total sales. Of this amount 54.9% comes from food and related products manufacturing, 19.2% from crops, livestock, forestry and fisheries production, 16.5% from agricultural inputs and services, and 9.4% from forestry products manufacturing.

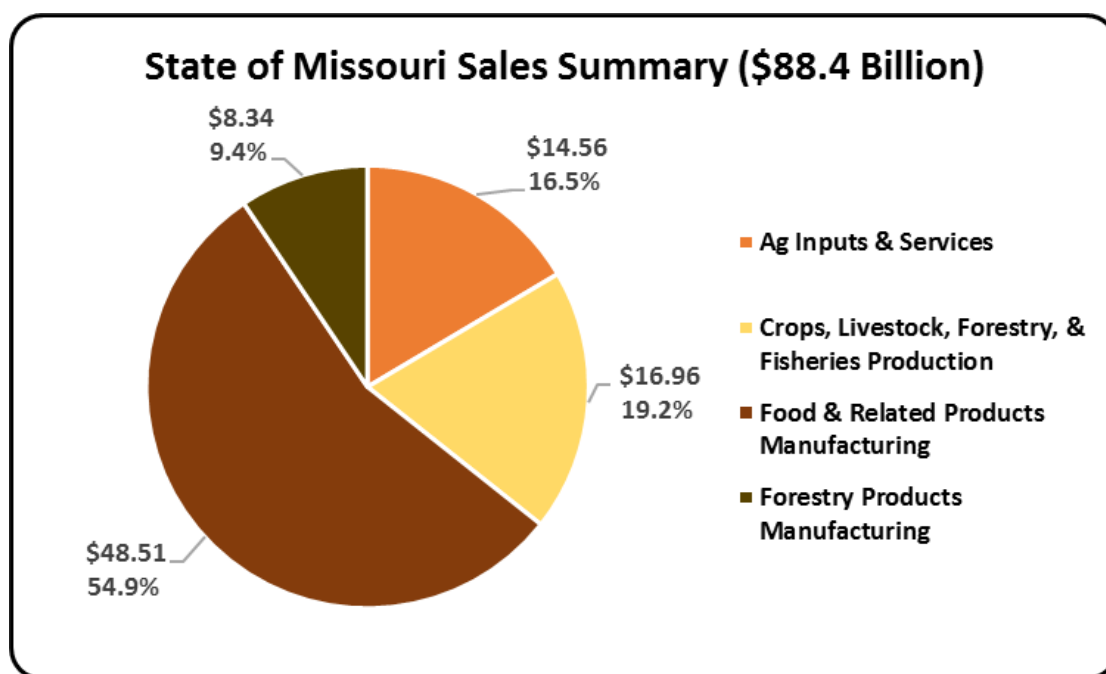


Figure 5, State of Missouri Value-Added Summary (\$B)

While agriculture, forestry, and related industries play an important role all across Missouri, certain counties rely more heavily on these industries. As shown below in Figure 6, St. Louis County has the greatest amount of sales derived from these industries at \$17.8 billion. Other top counties include Buchanan and Jackson both about \$5.5 billion. Detailed county and congressional district statistics are presented in separate reports, which can be found by clicking here: <http://agriculture.mo.gov/economicimpact/>.

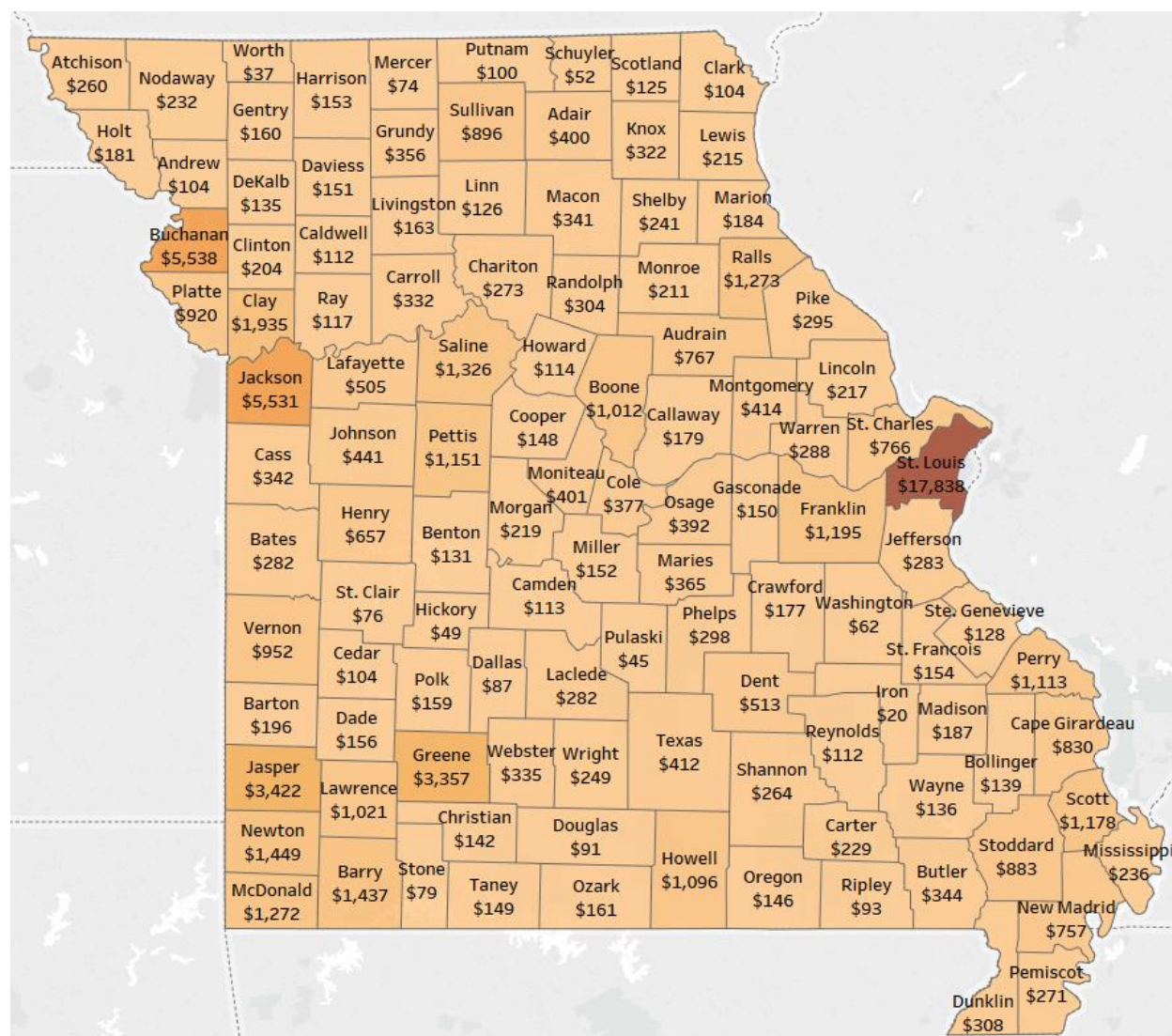


Figure 6, Agriculture, Forestry and Related Industries: Total Sales by County (\$M)

State Jobs

“Jobs⁶” represents an estimate of the number of positions (jobs) currently filled in an area and/or industry. The estimates provided here originate with the IMPLAN input-output model database. “Jobs” includes positions whether they are full or part time, so care must be used in making comparisons. “Jobs” does not count positions that are unfilled. All of the jobs in an area are generally referred to as “Total jobs.” Where “Jobs” are preceded by an industry name (such as “Agriculture Inputs and Services”) the number is an estimate of the number of jobs filled within that industry in the area specified.

As shown in Figure 7, Missouri’s agriculture, forestry and related economic activity contribute significantly to Missouri’s total jobs with 378,232 jobs. Of this, 38.2% comes from crops, livestock, forestry and fisheries production, 35.4% from food and related products manufacturing, 17.2% from agriculture inputs and services, and 9.2% from forestry products manufacturing.

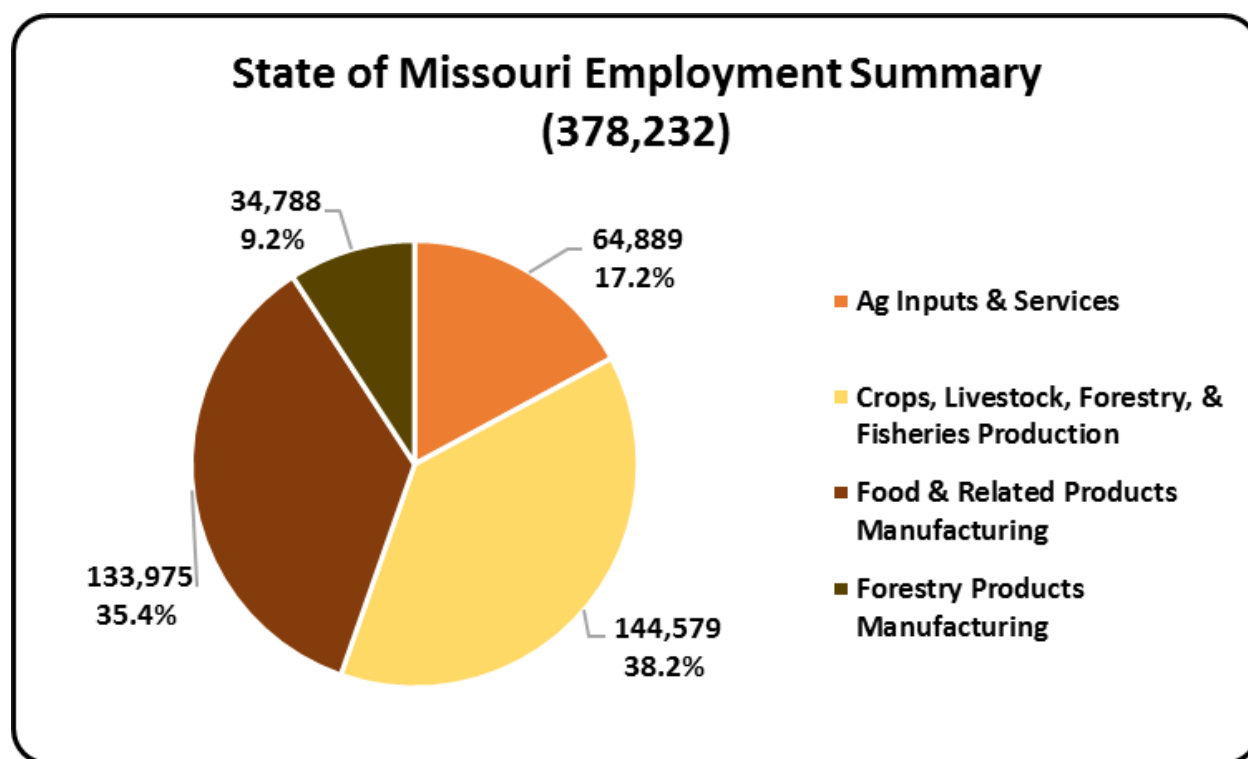


Figure 7, State of Missouri Employment Summary

⁶ Jobs do not refer to the number of people working or to full-time-equivalent employment. Jobs can be full or part time. A single individual can hold multiple jobs. In short, jobs cannot be looked upon as interchangeable or comparable across industries, businesses, or locations.

Agriculture, forestry, and related industries provide jobs all across Missouri. The number of agriculture and forestry jobs are closely tied to agriculture and forestry sales in a county. As shown below in Figure 8, St. Louis County has the largest number of jobs from these industries at 47,129 with Jackson County and Greene County having 18,869 and 12,634 jobs, respectively. Detailed county and congressional district statistics are presented in separate reports, which can be found here: <http://agriculture.mo.gov/economicimpact/>.

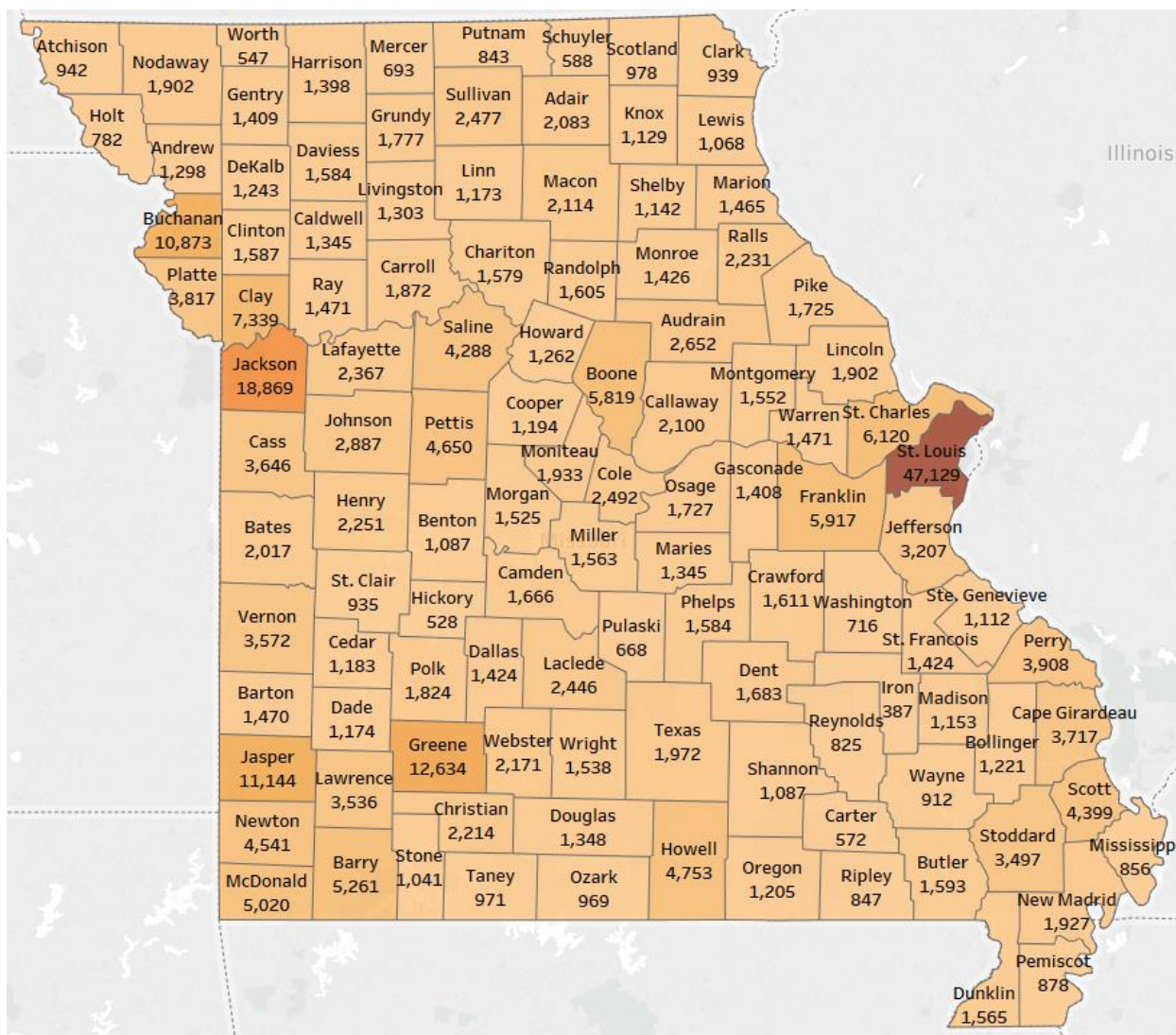


Figure 8, Agriculture, Forestry and Related Industries: Total Jobs by County

State Value-Added

“Total value-added” refers to that portion of the value of total sales that was actually created by the economic activity in an area and/or industry and is an accurate indicator of the ability of an industry to improve economic prospects in a given area. Total value-added for an industry represents the value of the industry’s total sales minus the value of any inputs used in the production process from other industries. Key components of value-added are employee compensation (hired labor) and proprietor’s income (self-employed), which is collectively called “labor income”.

Agriculture, forestry and related economic activity make a significant contribution to the economy in Missouri with about \$33.0 billion in value-added. Of this amount, 46.9% from food and related products manufacturing, 28.4% comes from crops, livestock, forestry and fisheries production, 15.2% from agriculture inputs and services, and 9.6% comes from forestry products manufacturing.

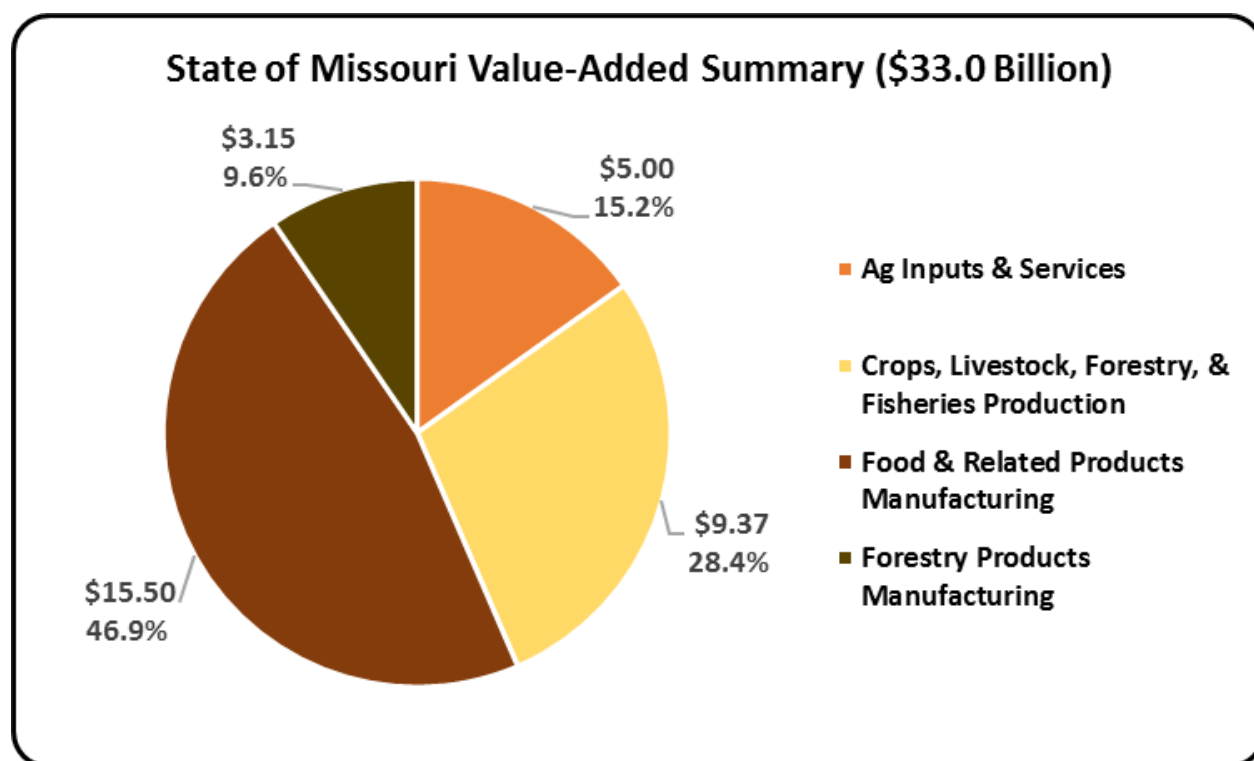


Figure 9, State of Missouri Value-Added Summary (\$B)

Value-added from agriculture, forestry and related industries is shown by county below in Figure 10. St. Louis County has the greatest amount of value-added derived from these industries at nearly \$7.4 billion. Jackson County adds \$2.1 billion in value-added to its economy from these industries. Detailed county and congressional district statistics are presented in separate reports, which can be found here: <http://agriculture.mo.gov/economicimpact/>.

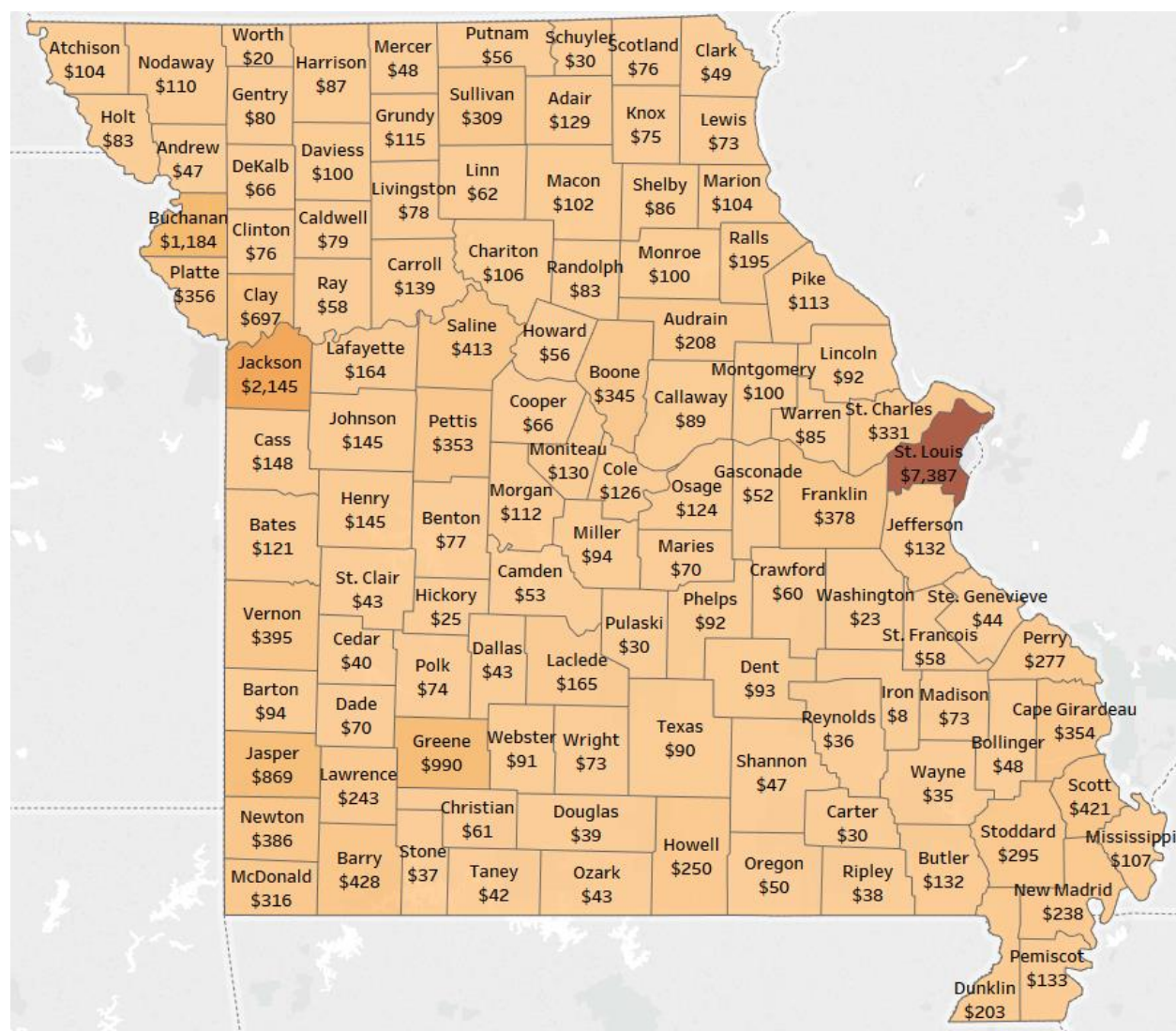


Figure 10, Agriculture, Forestry and Related Industries: Total Value-Added by County (\$M)

State Labor Income

“Labor income” is the sum of Employee Compensation (work for hire) and Proprietor Income (self-employed) and is a sub-component⁷ of value-added. Figure 11 illustrates the contribution of each of the four categories to Missouri’s total labor income. As shown, Missouri’s agriculture, forestry and related economic activities contribute significantly to the state economy at about \$17.5 billion in total labor income. Of this amount 45.5% comes from food and related products manufacturing, 27.4% from crops, livestock, forestry and fisheries production, 16.7% from agricultural inputs and services, and 10.4% from forestry products manufacturing.

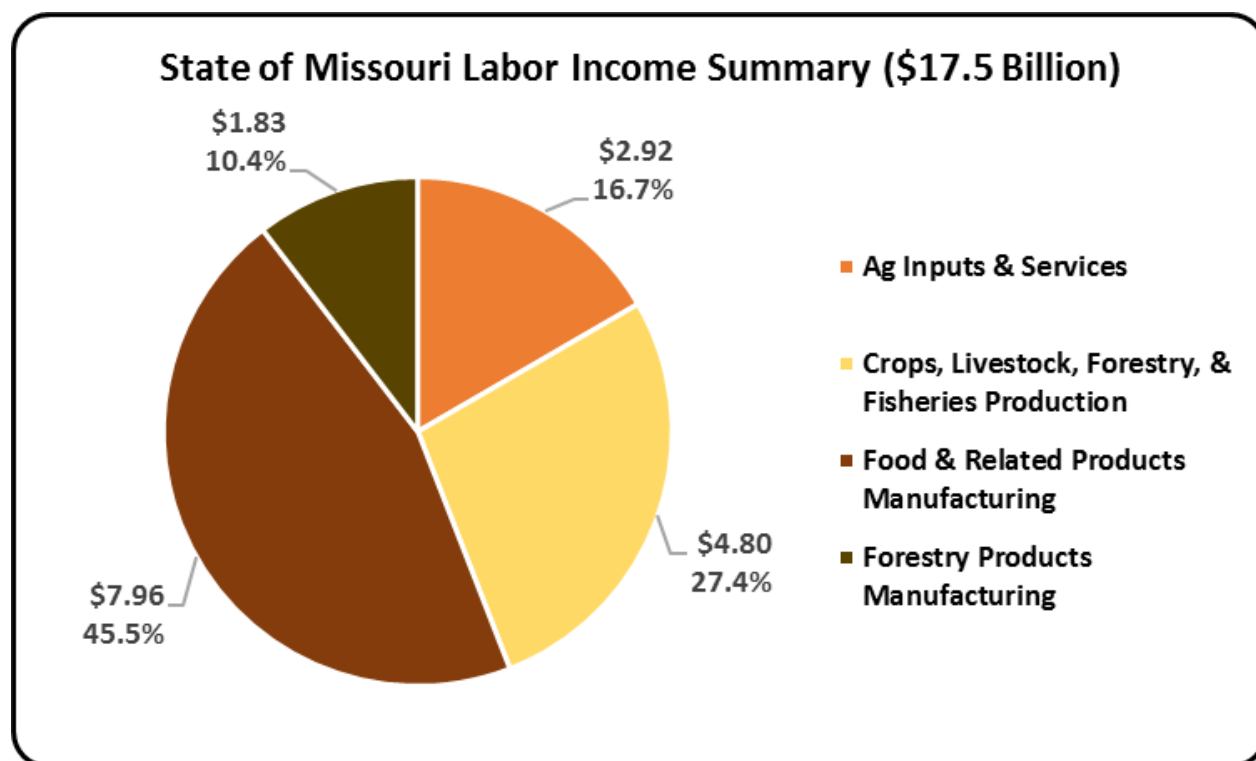


Figure 11, State of Missouri Labor Income Summary (\$B)

⁷ Because Labor Income is a sub-component of Value-Added, it should not be added to Value-Added results when discussing the overall economic contribution of Missouri agriculture and forestry.

Labor income from agriculture, forestry and related industries is shown by county below in Figure 12. St. Louis County has the greatest amount of labor income derived from these industries at nearly \$3.4 billion. Jackson County adds \$1.1 billion in labor income to its economy. Detailed county and congressional district statistics are presented in separate reports, which can be found here: <http://agriculture.mo.gov/economicimpact/>.

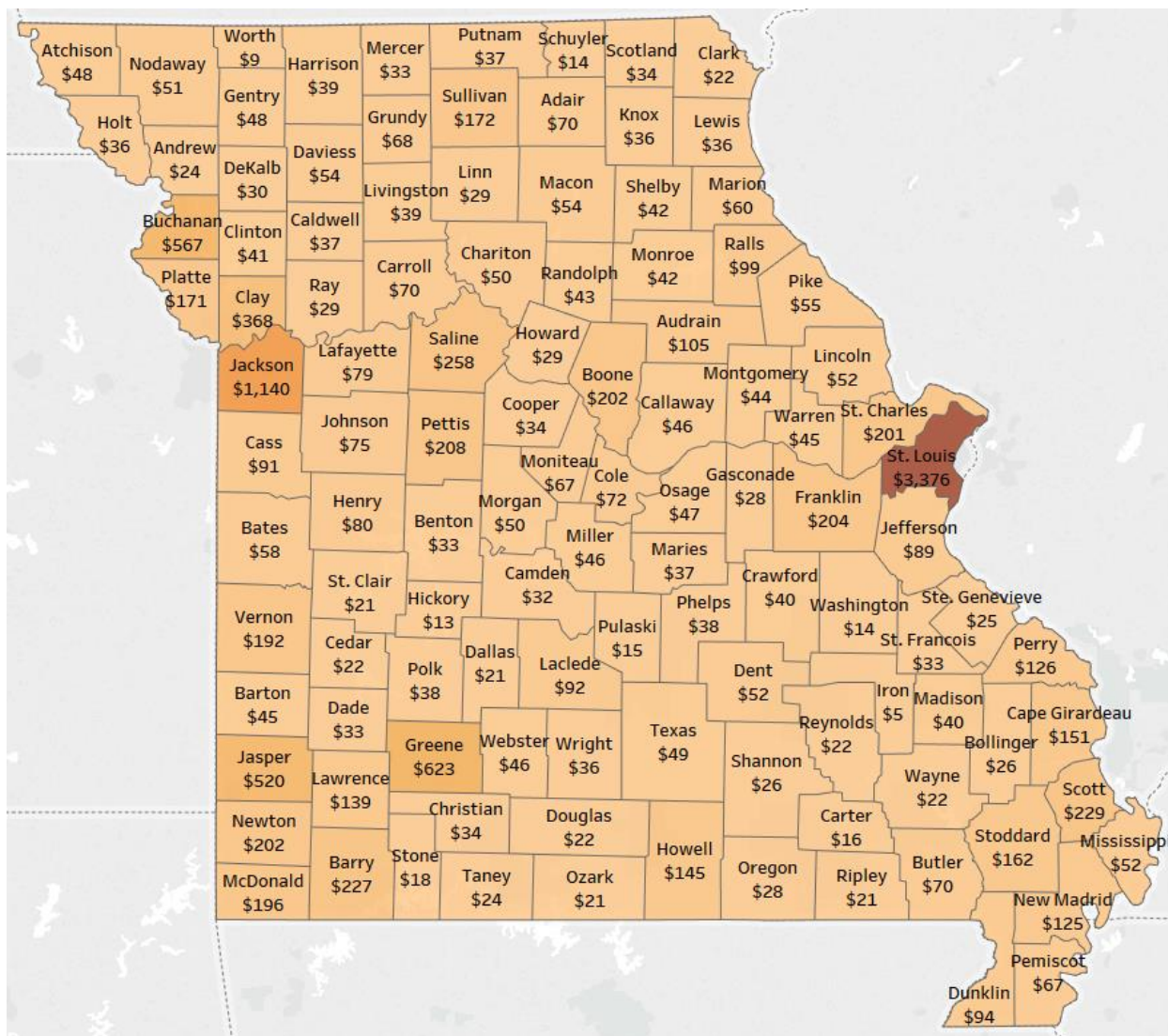


Figure 12, Agriculture, Forestry and Related Industries: Total Labor Income by County (\$M)

Tax Summary

Missouri's agriculture, forestry and related economic activities are also a significant source of tax revenue, contributing \$6.2 billion in taxes at all taxing levels. About \$2.2 billion of that figure goes to the state and local level, as well as about \$4.0 billion at the federal level. Estimates of taxes paid by Missouri agriculture, forestry, and related industries are shown in Figure 13.

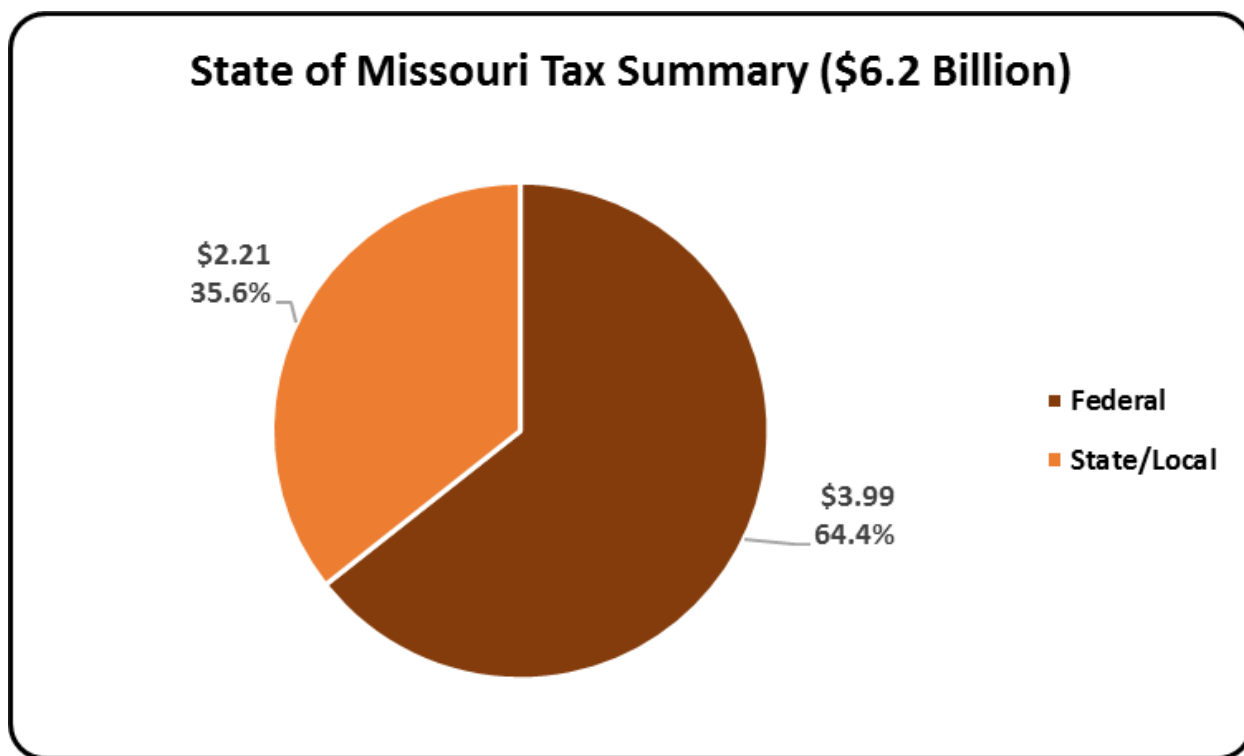


Figure 13, State of Missouri Tax Summary (\$B)

Results by Industry

The previous section of this study reported the state level results for these four broad categories: 1) Crops, Livestock, Forestry and Fishery Production, 2) Agriculture Inputs and Services, 3) Food and Related Products Manufacturing, and 4) Forestry Products Manufacturing. The following results by industry drills down further to show what specific industries are the major contributors to economic activity in each of the four aggregated categories. Goods and services used by the agriculture and forestry industries such as banking and insurance are not specifically shown, but they are embedded as required inputs for the agriculture and forestry industries.

Crops, Livestock, Forestry and Fishery Production

The crops, livestock, forestry and fishery production category includes industries such as crop and livestock farming, commercial logging, commercial fishing, support activities for agriculture and forestry, and more. For the full list, see Table 5 in Appendix A. Total value-added derived by the Missouri economy from crops, livestock, forestry and fishery production was \$9.4 billion, with the largest contributor being oilseed farming at \$2.3 billion (see Figure 14). Crops, livestock, forestry and fishery production also accounted for about 144,579 jobs and \$4.8 billion in labor income. Further industry detail for all of sales, employment, labor income and value-added are shown in Table 5 in Appendix A.

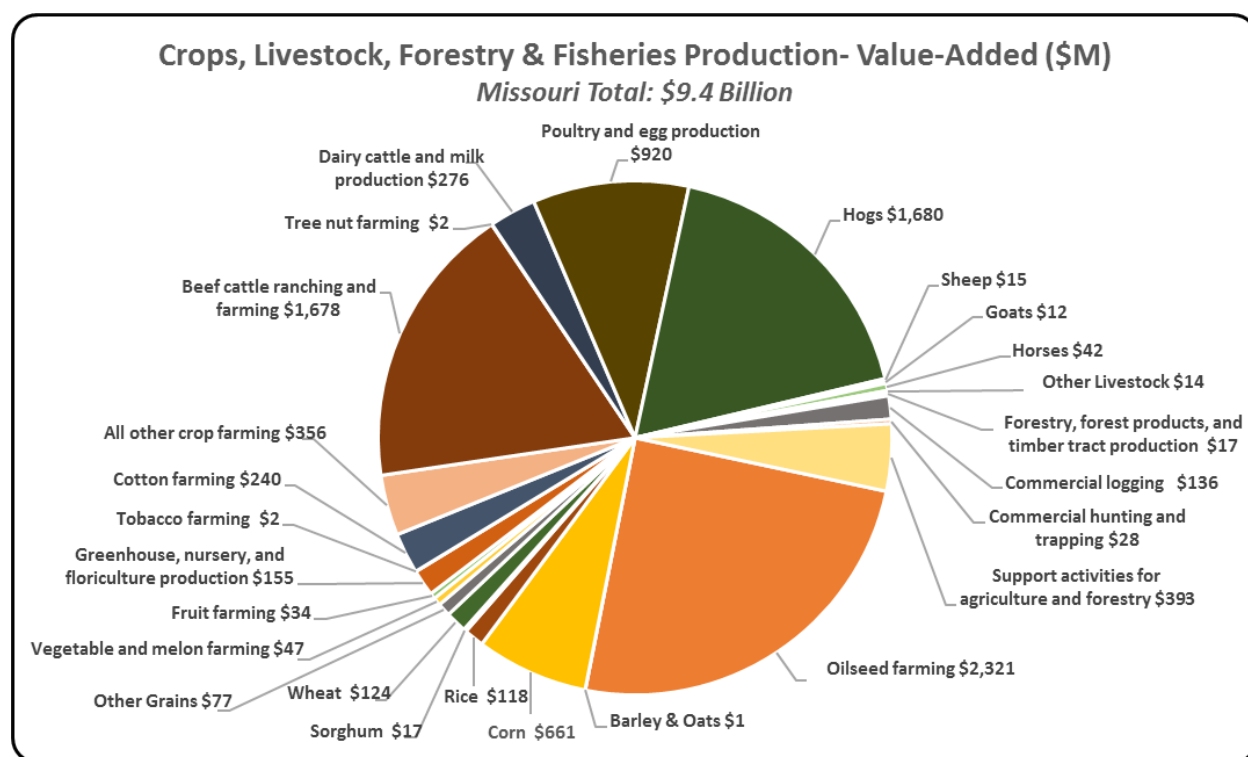


Figure 14, Missouri Crops, Livestock, Forestry & Fisheries Prod: Total Value-Added (\$M)

⁸ *Support activities for ag and forestry includes, but is not limited to: aerial dusting or spraying, animal semen banks, branding, cotton ginning, detasseling, forest firefighting and prevention, fruit sorting/grading/packing, horseshoeing, nut hulling and shelling, pruning of orchard trees and vines, reforestation, showing of livestock, etc.

Agriculture Inputs and Services

The agriculture inputs and services category includes industries such as nitrogen fertilizer manufacturing, pesticide and other agricultural chemical manufacturing, farm machinery and equipment manufacturing, veterinary services, landscape and horticulture services, and more. For the full list, see Table 6 in Appendix A. Total value-added derived by the economy from agriculture inputs and services in Missouri was \$5.0 billion (see Figure 15). Agriculture inputs and services also accounted for 64,889 jobs and \$2.9 billion in labor income. Further industry detail for all of sales, employment, labor income and value-added are shown in Table 6 in Appendix A.

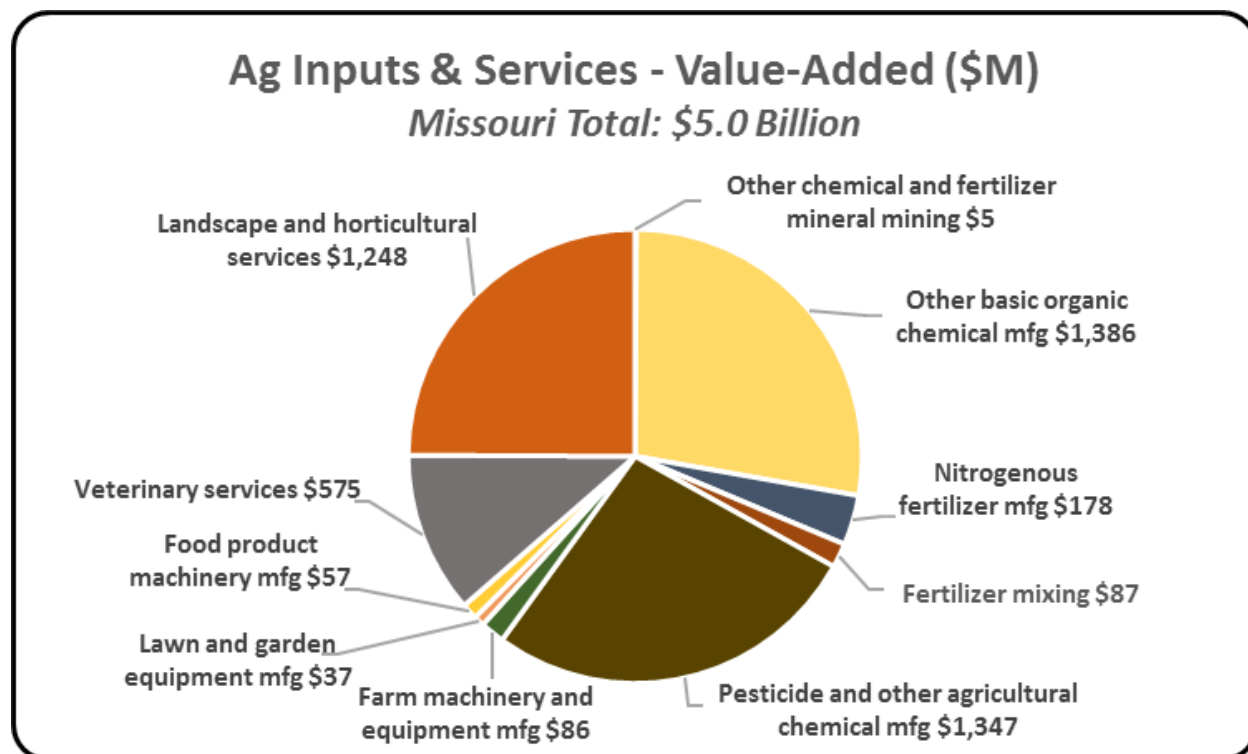


Figure 15, Missouri Agriculture Inputs and Services: Total Value-Added (\$M)

Food and Related Products Manufacturing

The food and related products manufacturing category includes industries such as animal slaughtering, various food manufacturing, soybean and other oilseed processing, flour milling, food product machinery manufacturing, breweries, and many more. For the full list, see Table 8 in Appendix A. Total value-added derived by the economy from food and related products manufacturing in Missouri was nearly \$15.5 billion, with the largest contributor of value-added in this category being Breweries at \$2.9 billion (see Figure 16). Food and related products manufacturing also accounted for 133,975 jobs and nearly \$8.0 billion in labor income. Full results including further detail for all of sales, employment, labor income and value-added are shown in Table 8 in Appendix A. This table also lists the industries included in the 'Other' category.

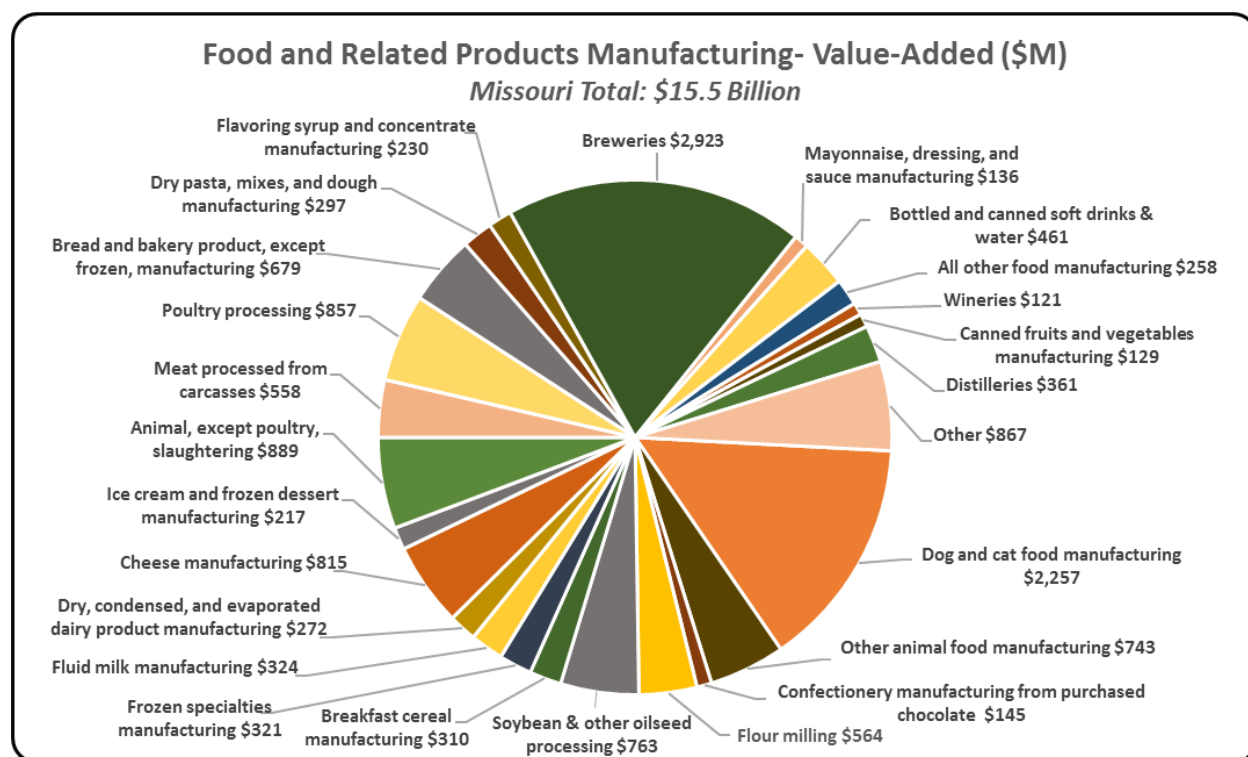


Figure 16, Missouri Food and Related Products Manufacturing: Total Value-Added (\$M)

Forestry Products Manufacturing

The forestry products manufacturing category includes industries such as sawmills, veneer and plywood manufacturing, paper mills, sawmill/woodworking and paper machinery, and many more. Total value-added contributed to the economy from forestry products manufacturing in Missouri was nearly \$3.2 billion (see Figure 17). Forestry products manufacturing industries also accounted for 34,788 jobs and \$1.8 billion in labor income. Further industry detail for all of sales, employment, labor income and value-added are shown in Table 7 in Appendix A.

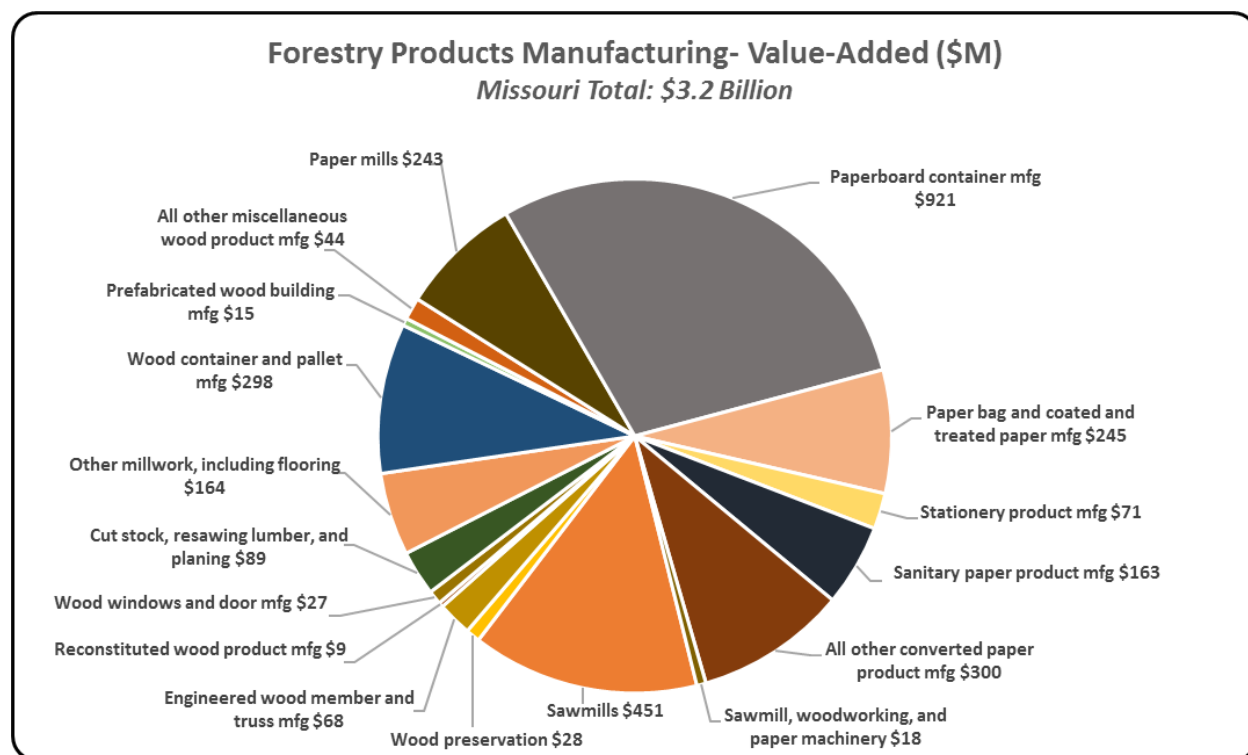


Figure 17, Missouri Forestry Products Manufacturing: Total Value-Added (\$M)

Looking Ahead

This study helps quantify the economic contribution of agriculture, forestry, and related industries in the State of Missouri. As demonstrated throughout this report, agriculture, forestry and their related industries are very important to the economy of Missouri, and it is expected that these industries will remain strong. Below are a few items to consider for the State of Missouri as it moves forward.

U.S. and Missouri Farm Income

In general, the last few years have been more financially-challenging for not just Missouri, but the nation as a whole. U.S. net cash income (gross cash income minus cash expenses) and U.S. net farm income (total gross income minus total expenses) in the 2016 calendar year are forecast to decline year over in response to low commodity prices. The latest USDA-ERS's Farm Income and Wealth Statistics data published on November 30, 2016, indicates that compared with the previous year, U.S. net farm income is forecast to decline 17.2% to \$66.9 billion, which would be the third annual decline in a row.

USDA/ERS cash receipt state data are available through 2015. Missouri's cash receipts for corn, soybeans, hogs and cattle/calves for 2016 were estimated assuming the USDA's forecast national level percent reduction for the corresponding commodities for 2016 relative to 2015. Based on this assumption, the resulting estimates shown in Figure 1 indicates that Missouri's 2016 corn cash receipts would decrease by \$0.07 billion, from \$1.87 billion in 2015 to \$1.80 billion in 2016. Soybean cash receipts would increase by \$0.3 billion, from \$1.89 billion in 2015 to \$2.19 billion in 2016. Missouri's cash receipts for hogs would decline to \$0.87 billion in 2016 compared with \$0.94 billion in 2015, and cattle/calves would drop to \$1.77 billion from the estimate for 2015 (\$2.07 billion).

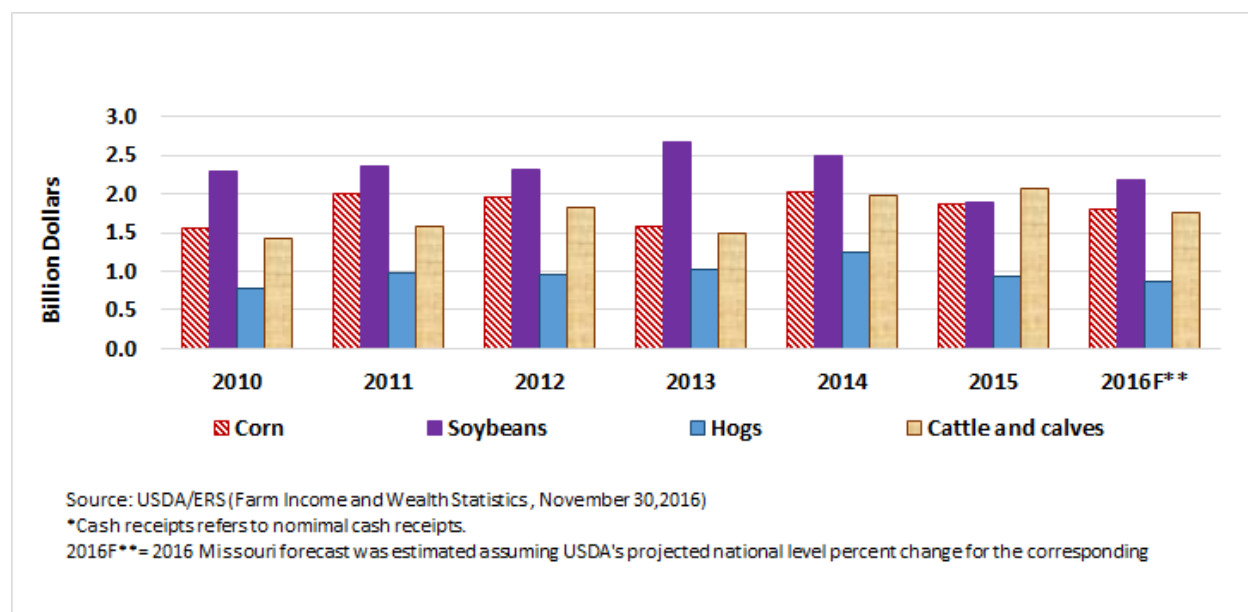


Figure 18, Missouri Cash Receipts: Selected Commodities

Aging Farmer Demographics

According to the 2012 USDA Census of Agriculture, the average age of farmers in Missouri is 58, up from 54 years in 1997. This average age leaves many farmers looking to transition their farm to a younger generation in the near future. Since row crop farming generally requires large capital investments, livestock and poultry farming is often times a good transition step to help young farmers get started in agriculture. Engaging in animal agriculture is generally a more physically-intense occupation than other portions of agriculture. This characteristic also lends itself to appeal to a younger generation. As the older generation of farmers continue to transition out of direct management of their farms, it is important to find ways to help young farmers get a successful start in their operations.

Fruit and Vegetable Production Opportunities

Rapidly rising urban growth in major Missouri cities and a state population over 6.1 million creates an increasing need for fruit and vegetable production to meet the rising demand for locally-grown produce among consumers. According to 2015 USDA/NASS⁹ statistics, Missouri ranks 10th in the country for production of grapes and pecans, and is also in the top 20 for watermelon, apple, and peach production. Due to the growing demand for locally-grown produce, this industry can be a good opportunity for the new generation to start in agriculture, particularly because these farms typically have a smaller geographic footprint.

Due to advances in technology, farmers can choose between conventional specialty crop production methods or rapidly rising organic food production methods. Some popular alternative marketing channels include farmers' markets, on-farm markets, farm-to-school, and super markets, which are all available to beginning farmers and are great starting points for a rising generation in agriculture.

⁹ https://www.nass.usda.gov/Statistics_by_State/Missouri/Publications/Annual_Statistical_Bulletin/2015/2015-MO_Annual_Bulletin_Rank.pdf

Appendix A, Detailed Results

Table 5, Missouri Crops, Livestock, Forestry and Fishery Production - Detailed Results¹⁰

<u>Industry</u>	<u>Inputs (\$M)</u>	<u>+</u>	<u>2016 Value-Added</u>	<u>=</u>	<u>2016 Total Sales</u>	<u>2016 Total Jobs</u>
Grain farming	\$2,475.1		\$998.6		\$3,473.8	19,730
Corn	\$1,639.0		\$661.3		\$2,300.3	13,065
Wheat	\$307.9		\$124.2		\$432.1	2,454
Rice	\$292.2		\$117.9		\$410.1	2,329
Other Grains	\$191.6		\$77.3		\$268.9	1,527
Sorghum	\$41.4		\$16.7		\$58.0	330
Oats	\$2.3		\$0.9		\$3.2	18
Barley	\$0.8		\$0.3		\$1.1	6
Beef cattle ranching and farming	\$1,614.3		\$1,678.1		\$3,292.5	40,825
Oilseed farming	\$947.5		\$2,320.7		\$3,268.2	12,531
Animal production, except cattle and poultry and eggs	\$517.6		\$1,763.9		\$2,281.5	32,391
Hogs	\$492.8		\$1,679.5		\$2,172.4	30,842
Horses	\$12.3		\$42.0		\$54.4	772
Sheep	\$4.5		\$15.5		\$20.0	285
Other Livestock	\$4.2		\$14.4		\$18.6	264
Meat Goats	\$3.1		\$10.4		\$13.4	191
Dairy Goats	\$0.6		\$1.9		\$2.5	35
Angora Goats	\$0.0		\$0.1		\$0.2	2
Poultry and egg production	\$1,070.3		\$920.3		\$1,990.6	5,972
Broilers	\$483.3		\$415.5		\$898.8	2,696
Turkeys	\$309.3		\$265.9		\$575.2	1,726
Layers	\$267.8		\$230.3		\$498.1	1,494
Other Poultry	\$9.9		\$8.5		\$18.5	55
Support activities for agriculture and forestry	\$183.5		\$393.2		\$576.7	9,254
All other crop farming	\$182.6		\$356.2		\$538.9	13,261
Dairy cattle and milk production	\$214.2		\$276.1		\$490.2	1,985
Cotton farming	\$123.9		\$239.5		\$363.4	1,964
Commercial logging	\$130.6		\$136.2		\$266.7	2,792
Greenhouse, nursery, and floriculture production	\$56.6		\$154.8		\$211.4	1,592
Vegetable and melon farming	\$15.3		\$47.1		\$62.4	408
Commercial hunting and trapping	\$27.2		\$27.7		\$55.0	911
Fruit farming	\$8.8		\$34.0		\$42.8	535
Forestry, forest products, and timber tract production	\$19.0		\$17.4		\$36.4	376
Tree nut farming	\$0.5		\$2.4		\$2.9	30
Tobacco farming	\$0.9		\$1.7		\$2.5	24
Crops, Livestock, Forestry & Fishery Production Total	\$7,587.9		\$9,367.8		\$16,955.7	144,579

¹⁰ **Sales:** The broadest measure of economic activity – sometimes referred to as “output”; **Employment (Jobs):** A measure of job positions without regard to whether they are full-time equivalents; **Value-Added:** Sales (output) minus the cost of inputs

Table 6, Missouri Agriculture Inputs & Services - Detailed Results

<u>Industry</u>	Inputs (\$M)	+	2016 Value-Added (\$M)	=	2016 Total Sales (\$M)	2016 Total Jobs
Other basic organic chemical manufacturing	\$5,116.9		\$1,385.9		\$6,502.7	12,539
Pesticide and other agricultural chemical manufacturing	\$2,107.6		\$1,346.9		\$3,454.5	8,176
Landscape and horticultural services	\$783.1		\$1,247.5		\$2,030.6	29,675
Veterinary services	\$528.9		\$574.7		\$1,103.6	10,156
Nitrogenous fertilizer manufacturing	\$426.0		\$177.9		\$603.9	1,343
Farm machinery and equipment manufacturing	\$240.2		\$86.1		\$326.3	1,092
Fertilizer mixing	\$141.7		\$86.9		\$228.6	659
Lawn and garden equipment manufacturing	\$121.1		\$37.4		\$158.6	504
Food product machinery manufacturing	\$86.7		\$56.7		\$143.4	699
Other chemical and fertilizer mineral mining	\$3.6		\$4.5		\$8.2	47
Agriculture Inputs & Services Total	\$9,555.7		\$5,004.7		\$14,560.4	64,889

Table 7, Missouri Forestry Products Manufacturing - Detailed Results

<u>Industry</u>	Inputs (\$M)	+	2016 Value-Added (\$M)	=	2016 Total Sales (\$M)	2016 Total Jobs
Paperboard container manufacturing	\$1,768.1		\$921.1		\$2,689.3	9,725
Sawmills	\$917.8		\$451.4		\$1,369.2	6,578
All other converted paper product manufacturing	\$375.7		\$300.5		\$676.2	2,572
Wood container and pallet manufacturing	\$355.8		\$297.5		\$653.3	4,502
Paper mills	\$408.4		\$242.6		\$651.0	1,782
Paper bag and coated and treated paper manufacturing	\$400.3		\$244.7		\$645.1	2,043
Other millwork, including flooring	\$207.1		\$164.1		\$371.3	2,146
Sanitary paper product manufacturing	\$151.3		\$162.6		\$313.9	631
Cut stock, resawing lumber, and planing	\$139.6		\$89.3		\$228.9	1,147
Stationery product manufacturing	\$120.7		\$71.3		\$191.9	721
Engineered wood member and truss manufacturing	\$111.2		\$67.9		\$179.1	1,065
All other miscellaneous wood product manufacturing	\$59.9		\$43.5		\$103.4	630
Wood preservation	\$60.5		\$28.1		\$88.6	323
Wood windows and door manufacturing	\$37.4		\$27.5		\$64.9	363
Sawmill, woodworking, and paper machinery	\$31.3		\$18.2		\$49.5	272
Prefabricated wood building manufacturing	\$18.8		\$14.8		\$33.7	200
Reconstituted wood product manufacturing	\$19.5		\$9.4		\$28.9	90
Forestry Products Manufacturing Total	\$5,183.5		\$3,154.6		\$8,338.1	34,788

Table 8, Missouri Food and Related Products Manufacturing - Detailed Results

<u>Industry</u>	Inputs (\$M)	+	2016 Value-Added (\$M)	=	2016 Total Output (\$M)	2016 Total Jobs
Dog and cat food manufacturing	\$3,756.0		\$2,256.7		\$6,012.7	12,209
Breweries	\$2,826.7		\$2,923.0		\$5,749.7	13,456
Animal, except poultry, slaughtering	\$3,260.0		\$888.6		\$4,148.5	9,858
Soybean and other oilseed processing	\$2,948.3		\$763.0		\$3,711.3	7,003
Cheese manufacturing	\$2,660.6		\$815.0		\$3,475.6	8,279
Poultry processing	\$2,275.3		\$856.8		\$3,132.1	13,053
Other animal food manufacturing	\$2,249.6		\$742.8		\$2,992.4	6,726
Meat processed from carcasses	\$1,761.1		\$558.1		\$2,319.2	6,696
Flour milling	\$1,196.3		\$564.3		\$1,760.6	4,576
Bottled and canned soft drinks & water	\$989.9		\$460.6		\$1,450.5	4,204
Bread and bakery product, except frozen, manufacturing	\$668.3		\$679.3		\$1,347.6	9,920
Dry, condensed & evaporated dairy product mfg	\$983.6		\$271.7		\$1,255.3	2,587
Fluid milk manufacturing	\$916.0		\$324.0		\$1,240.0	3,309
Frozen specialties manufacturing	\$708.3		\$321.4		\$1,029.7	4,067
Breakfast cereal manufacturing	\$629.5		\$310.5		\$940.0	2,485
Dry pasta, mixes, and dough manufacturing	\$536.4		\$296.8		\$833.2	2,761
All other food manufacturing	\$522.0		\$257.6		\$779.5	3,263
Fats and oils refining and blending	\$582.6		\$118.0		\$700.6	1,205
Flavoring syrup and concentrate manufacturing	\$442.6		\$230.4		\$673.0	1,259
Distilleries	\$260.4		\$360.9		\$621.3	1,155
Ice cream and frozen dessert manufacturing	\$369.0		\$217.5		\$586.5	2,149
Mayonnaise, dressing, and sauce manufacturing	\$287.1		\$136.2		\$423.3	1,161
Canned fruits and vegetables manufacturing	\$272.7		\$129.2		\$401.8	1,277
Confectionery manufacturing from purchased chocolate	\$254.2		\$144.7		\$398.9	1,650
Wineries	\$257.1		\$121.4		\$378.6	1,855
Spice and extract manufacturing	\$237.5		\$117.3		\$354.8	1,204
Rendering and meat byproduct processing	\$205.9		\$115.6		\$321.5	1,174
Other snack food manufacturing	\$179.9		\$90.2		\$270.0	766
Frozen fruits, juices and vegetables manufacturing	\$146.3		\$85.2		\$231.5	850
Cookie and cracker manufacturing	\$129.2		\$74.5		\$203.7	854
Coffee and tea manufacturing	\$103.3		\$52.2		\$155.5	542
Rice milling	\$96.3		\$32.4		\$128.7	350
Frozen cakes and other pastries manufacturing	\$55.2		\$50.2		\$105.4	643
Creamery butter manufacturing	\$56.1		\$20.0		\$76.1	175
Manufactured ice	\$45.9		\$24.5		\$70.4	526
Roasted nuts and peanut butter manufacturing	\$35.5		\$20.2		\$55.7	171
Nonchocolate confectionery manufacturing	\$34.6		\$18.1		\$52.7	209
Chocolate & confectionery mfg from cacao beans	\$16.6		\$14.1		\$30.7	87
Malt manufacturing	\$21.7		\$8.2		\$29.8	70
Tobacco product manufacturing	\$13.5		\$13.3		\$26.8	45
Seafood product preparation and packaging	\$11.8		\$6.2		\$18.0	74
Canned specialties	\$6.3		\$3.3		\$9.6	29
Dehydrated food products manufacturing	\$6.1		\$2.5		\$8.6	32
Tortilla manufacturing	<u>\$1.3</u>		<u>\$1.6</u>		<u>\$2.9</u>	<u>14</u>
Food and Related Products Manufacturing Total	\$33,016.6		\$15,497.9		\$48,514.5	133,975